

represents the outer boundary of the overall screen image, (col. 1, ln. 41-col. 2, ln. 12). Those images that fall outside the boundary are never displayed as they are discarded from any further processing, (col. 1, lns. 57-col. 2, ln. 12). Further, the graphic information to be clipped is decomposed into its edges and the edges simultaneously clipped along pairs of parallel clip planes. Successive parallel operations are performed on polygons recomposed using the clipped output edges, until clipping against all clip planes has been performed. (col. 3, lns. 16-23). As such, Narayanaswami et al. does not disclose a system where tiles are used to render a larger image made up of multiple tiles.

Lentz et al.

Lentz et al. is directed to a system for polygon rasterization. The Summary Of The Invention section describes the system as using edge functions, which classify each pixel within the plane of the polygon, to display such polygons. Such pixels are rendered based on the value of its edge function variables. Each pixel within a triangle has associated with it a set of multiple edge variables that are used in rendering such pixels. Lentz et al. does not disclose the use of tiles, sorting vertex data, generating region bits, nor the generating an initial rasterization starting point estimate according to the region bits.

Sfarti

Sfarti is directed to a system for rasterizing polygons at an arbitrary precision. The Summary Of The Invention describes a system where pixels are tested for being inside a triangle by sorting the vertices by their values in one coordinate, rounding the vertices to the nearest pixels, and calculating two characteristic functions for pixels one scan line at a time, thereby identifying two end pixels for the scan line, where the particular functions used are edge characteristic functions for the two edges which bound pixels in the scan line within the triangle defined by the rounded vertices. Because the vertices are sorted, which edges bound which scan

lines are therefore easily determined. However, even though the vertices are sorted, they are not used in conjunction with region bits, tiles or an initial rasterization starting point estimate.

Claims 1-2, 14-22 and 24-40

The Office Action rejected claims 1-2, 14-22 and 24-40 under 35 U.S.C. 103(a) as being unpatentable over Narayanaswami et al. (6,052,128) in view of Lentz et al. (5,446,836), and further in view of Sfarti (5,528,737).

Independent Claim 1

First, Applicants acknowledge the Examiner's statements from both the prior Office Action that Narayanaswami et al. fails to disclose an initial rasterization starting point estimate, and the statement from the current Office Action that Narayanaswami et al. fails to disclose "generating coordinate data representing an initial rasterization starting point estimate." Applicants also acknowledge the Examiner's statement that Narayanaswami et al. fails to disclose sorting the vertex data.

Applicants further submit that not only does Narayanaswami et al. not disclose, teach or suggest Applicants' claimed subject matter including, inter alia, "... sorting vertex data in coordinate-dependent fashion," (claim 1), but is wholly different than Applicants' claimed subject matter. Narayanaswami et al. is absent any discussion that would suggest that any type of rasterization is being performed that the typical rasterization scheme where an entire screen image is populated pixel by pixel (See Spec. pg. 10, lns. 20-25). As such, Narayanaswami et al. does not disclose, teach or suggest any reason as to why the sorting of vertex data would be beneficial. As such, to introduce sorting of vertex data to Narayanaswami et al. would mean to degrade its performance without benefit, as such operations would use up system resources that could be used by other Narayanaswami et al. processes.

Applicants submit that although Sfarti discusses the sorting of vertices by their values in one coordinate, Sfarti is absent any disclosure, teaching or suggestion, whether considered alone, or in combination with the other references, of Applicants' claimed subject matter regarding "sorting vertex data in coordinate-dependent fashion ... and discarding the sorted vertex data ... that lie outside the boundary of the current tile being rendered," (claim 1). Instead, Sfarti's sorting is for the purpose to identify two end pixels for a scan line, identified by edge functions associated with the two edges which bind the pixels in the scan line within the triangle defined by the vertices. As such, the particular type of sorting performed, and the use made of the sorted vertex data is wholly unlike that represented by Applicants' claimed subject matter.

Applicants also submit that Narayanaswami et al. fails to disclose, teach or suggest, whether considered alone, or in combination with the other cited art, Applicants' claimed subject matter including, inter alia, "... generating region bits representing the location of the sorted vertex data with respect to a current tile being rendered ...," (claim 1). First, Applicants submit that Narayanaswami et al. does not disclose the use of Applicants' tiles. In contrast, Narayanaswami et al. simply discloses the rendering of one large screen image represented by the boundary 30 as shown in Fig. 3. Narayanaswami et al. is absent discussion of breaking its larger display space into adjacent tiles. In support, Applicants note that Narayanaswami et al. discloses that objects falling outside of the boundary 30 are discarded from further processing, suggesting that objects falling outside the boundary will not be in the displayed image or another tile (if Narayanaswami et al. disclosed such tiles). Applicants submit that without tiles, there is no need in Narayanaswami et al. to generate region bits associated with such non-existent tiles. Therefore, Applicants again submit that Narayanaswami et al. does not disclose, teach or suggest Applicants' claimed subject matter.

Next, Narayanaswami et al. is absent any disclosure, teaching or suggestion, whether considered alone, or in combination with the other cited art, for the use of region bits for any purpose including for use in representing the location of vertex data with respect to individual tiles. As discussed above, Narayanaswami et al. does not disclose, teach or suggest Applicants' tiles nor sorted vertex data. Without the disclosure of such tiles or sorted vertex data, Applicants submit that Narayanaswami et al. does not and cannot disclose Applicants' region bits, which "represent ... the location of the sorted vertex data with respect to a current tile." Further, because Narayanaswami et al. does not disclose tiles Narayanaswami et al. does not disclose a need for having to identify a location outside of a tile and therefore presents no need for such region bits. Applicants submit that any indicators indicating whether something is outside of a screen image is wholly different than indicators that indicate whether something is inside a screen image, but outside a tile.

Applicants submit that Narayanaswami et al. fails to disclose, teach or suggest, whether considered alone, or in combination with the other cited art, Applicants' claimed subject matter including, inter alia, "... generating coordinate data representing an initial rasterization starting point estimate when the region bits indicate that at least one of the sorted vertex data lies within the current tile being rendered and discarding the sorted vertex data of primitives that lie outside the boundary of the current tile being rendered ..., " (claim 1). First, Applicants submit that Narayanaswami et al. does not disclose an "initial rasterization starting point estimate." In support, Applicants reiterate that Narayanaswami et al. does not indicate a rasterization process that is other than a typical rasterization process where an entire screen image is populated pixel by pixel without the use of any form of an initial rasterization starting point estimate. (See Spec. pg. 10, lns. 20-25). In contrast, Narayanaswami et al. is generally focused to a system for clipping using an SIMD computer to render an entire screen image.

The Office Action states that the step of generating coordinate data for an initial rasterization starting point estimate is necessarily required for displaying a clipped image by a rasterizer. Applicants traverse this point as no such initial rasterization starting point estimate need be generated, nor is generated, in conjunction with that disclosed in Narayanaswami et al. Just as in a typical rasterization process, one next pixel is generated at a time, and where such next pixel happens to be a point in an object, then such pixel is then rendered with the object information, however, such pixel was found not by any estimation of such pixel, but simply by the sequential processing of one pixel after another. As such, what is disclosed in Narayanaswami et al. is in contrast to Applicants' claimed subject matter which avoids the pixel by pixel search of the first point of a primitive by instead, generating such an initial rasterization starting point estimate.

Applicants also submit that to the extent Lentz et al. describes a system using edge functions which classify each pixel within the plane of the polygon to display such polygons, and where the rendering of pixels is based on the value of pixels edge variables, that Lentz et al. is absent any disclosure, teaching or suggestion of Applicants' claimed subject matter. Applicants submit that Lentz et al. focuses on edge functions rather than vertices. Although the edges of such polygons are defined by vertices, the system focuses on the processing of the polygons in relation to their edge functions rather than their vertex data. Lentz et al. also appears to focus on rendering the polygons themselves, regardless where they fall within the actual display area. As such, Lentz et al. appears to be absent any use of tiling as its focus is on a polygon itself, whether or not such a polygon might cross what would otherwise be multiple tiles. Further, with the absence of any disclosure of tiles in Lentz et al., Applicants submit, further implies the lack of any use of region bits therein as region bits are specifically tied to the use of tiles that make up only a subsection of a larger display. Applicants submit that at least because Lentz et al. does

not disclosure the use of tiles, that therefore Lentz et al. does not disclose, teach or suggest, Applicants' use of an initial rasterization starting point estimate, as such point estimate is based on a location with a tile representing a first point of a primitive therein. Applicants refer to the steps of Figs. 11_A and 11_B, and the Lentz et al. disclosure generally, to submit that Lentz et al. does not disclose (1) the sorting of vertex data for use with tiles, (2) use of tiles, (3) use of region bits, and (4) generating an initial rasterization starting point estimate.

Applicants further submit that Narayanaswami et al. fails to disclose, teach or suggest, whether considered alone, or in combination with the other cited art, Applicants' claimed subject matter including, inter alia, "... providing the initial rasterization starting point estimate to the rasterizer ..., " (claim 1). Applicants refer the Examiner to the above arguments directed to the lack of any disclosure, teaching or suggestion in Narayanaswami et al., when considered alone, or in combination with the other cited references, for the use of an initial rasterization starting point estimate.

Applicants note that in order for prior art references to be combined by obviousness, at a minimum, there must be a suggestion of desirability for the modification. Applicants submit that neither Narayanaswami et al., Lentz et al, nor Sfarti, suggest a desirability for modification, explicit or otherwise. In addition, there must be a teaching or suggestion to make the combination and a reasonable expectation of success must be both found in the prior art, and not based on applicant's disclosure. Further, the level of skill in the art cannot be relied upon to provide the suggestion to combine references. Additionally, since none of the cited references teach or suggest the use of tiles, sorting of vertex data for use with tiles, use of region bits, and generating an initial rasterization starting point estimate, the combination of any of the cited references cannot produce the Applicant's invention as claimed.

Further, Applicants respectfully submit that the Office Action uses improper hindsight reasoning by suggesting it would have been obvious to modify Narayanaswami et al., Lentz et al, and Sfarti to achieve Applicant's, claim 1 subject matter, where the Office Action, using impermissible hindsight, bases such arguments only upon the teaching or suggestion within Applicants' own disclosure. Applicants submit that there must be some suggestion or motivation, either in the reference itself, or in the knowledge of generally available to one of ordinary skill in the art, to modify the reference as described. Further, to the extent that the Office Action relies on a position that modifications of Narayanaswami et al., Lentz et al, and Sfarti to meet the claimed invention would have been well within the ordinary skill of the art at the time Applicants' invention was made, because the references, and/or the knowledge of one skilled in the art, were individually known to those of skilled in the art, is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. Applicants submit that if one of ordinary skill in the art at the time of Applicants' invention were to read Mergard, including that disclosed in Narayanaswami et al., Lentz et al, and Sfarti, such a person would not be in possession of Applicants' claimed subject matter.

Dependent Claim 2

First, Applicants acknowledge the Examiner's statement that Narayanaswami et al. fails to disclose generating an orientation bit representing an orientation of a line connecting the first and second vertices of the stored primitive with respect to a line connecting the first and third vertices of the sorted primitive before generating the initial rasterization starting point coordinates.

Applicants submit that determining an orientation of a one line connecting two vertices of a triangle to another line connecting other vertices of the triangle, are not necessarily required in

rendering such objects. For example, in a left to right sweep of the pixels on the screen, all that is needed is that the system know that a particular pixel lies within the triangle, and need not necessarily know any orientation of one side of the triangle or another, or even that the edge of the object represents a line, rather than a point or a curve.

Further, regarding Schroeder, such reference identifies whether vertices are arranged in a clockwise or counter-clockwise order, but, Applicants submit does not disclose, teach or suggest Applicants' claimed subject matter including: "... an orientation bit representing an orientation of a line connecting the first and second vertices of the sorted primitive with respect to a line connecting the first and third vertices of the sorted primitive before generating the initial rasterization starting point coordinates," (claim 2). More specifically, the orientation of a line is wholly different than the clockwise/counter-clockwise direction of one vertex when compared to another. Further, because Schroeder is also absent any disclosure, teaching or suggestion of Applicants sorting vertices and the use of an initial rasterization starting point, Schroeder also does not disclose, teach or suggest, whether considered alone or in combination with the other cited references, Applicants' claimed subject matter.

In addition, Applicants also submit that because claim 2 depends from claim 1, and as a dependent claim therefrom, claim 2 is allowable for at least the reasons claim 1 is allowable. Applicants further submit that claim 2 is also allowable in light of the presence of novel and non-obvious elements contained in claim 2 that are not otherwise present in claim 1.

Independent Claim 14

Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 14 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any

combination of the cited references, of (1) the sorting of vertex data for use with tiles, (2) use of tiles, (3) use of region bits, and (4) generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 14 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

Dependent Claim 15

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia:

“The circuit of Claim 14, wherein the initial rasterization starting point circuit further includes a trivial accept circuit operative to provide the actual coordinates of the primitive as the initial rasterization starting point in response to the region bits,”

(Claim 15). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 15 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of the use of tiles, the use of region bits, and the generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 15 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

In addition, Applicants also submit that because claim 15 depends from claim 14, and as a dependent claim therefrom, claim 15 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 15 is also allowable in light of the presence of novel and non-obvious elements contained in claim 15 that are not otherwise present in claim 14.

Dependent Claim 16

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicants' claimed subject matter including, inter alia:

“The circuit of Claim 15, wherein the vertex data is sorted in y-coordinate fashion and the trivial accept circuit provides the x-coordinate and sorted y-coordinate rasterization starting point of a non-discarded primitive,”

(Claim 15). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 16 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of the use of tiles and the generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 16 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

In addition, Applicants also submit that because claim 16 depends from claim 15, and as a dependent claim therefrom, claim 16 is allowable for at least the reasons claim 15 is allowable. Applicants further submit that claim 16 is also allowable in light of the presence of novel and non-obvious elements contained in claim 16 that are not otherwise present in claim 15.

Dependent Claim 17

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicants' claimed subject matter including, inter alia:

“The circuit of Claim 14, wherein the vertex data includes x-coordinate position data and y-coordinate position data and further including an intercept calculation circuit operative to generate the initial rasterization starting point when the x-

coordinate position data or the y-coordinate position data intercepts the boundary defined by the region bits,”

(Claim 17). Applicants direct the Examiner’s attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 17 is allowable as written. In further support of Applicants’ position, and directing the Examiner’s attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of the use of tiles, the use of region bits, and the generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 17 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

In addition, Applicants also submit that because claim 17 depends from claim 14, and as a dependent claim therefrom, claim 17 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 17 is also allowable in light of the presence of novel and non-obvious elements contained in claim 17 that are not otherwise present in claim 14.

Dependent Claim 18

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicant’s claimed subject matter including, inter alia:

“The circuit of Claim 17, wherein the boundary interception point generated by the intercept calculation circuit represents the initial rasterization point starting point coordinate,”

(Claim 18). Applicants direct the Examiner’s attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 18 is allowable as written. In further support of Applicants’ position, and directing the Examiner’s attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of the use of generating an initial rasterization starting point

estimate. As such, Applicants submit that the claimed subject matter of claim 18 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

In addition, Applicants also submit that because claim 18 depends from claim 17, and as a dependent claim therefrom, claim 18 is allowable for at least the reasons claim 17 is allowable. Applicants further submit that claim 18 is also allowable in light of the presence of novel and non-obvious elements contained in claim 18 that are not otherwise present in claim 17.

Dependent Claim 19

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia:

“The circuit of Claim 14, further comprising an interception calculation circuit operative to provide a coordinate dependent initial rasterization starting point in response to the region bits and the sorted vertex data,”

(Claim 19). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 19 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of the use of the sorting of vertex data for use with tiles, use of tiles, use of region bits, and generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 19 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

In addition, Applicants also submit that because claim 19 depends from claim 14, and as a dependent claim therefrom, claim 19 is allowable for at least the reasons claim 14 is allowable.

Applicants further submit that claim 19 is also allowable in light of the presence of novel and non-obvious elements contained in claim 19 that are not otherwise present in claim 14.

Dependent Claim 20

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia:

“The circuit of Claim 15, wherein the trivial accept circuit further comprises a logic gate coupled to a corresponding subset of the region bits,”

(Claim 20). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 20 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, use of tiles and use of region bits. As such, Applicants submit that the claimed subject matter of claim 20 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

Applicants also submit that because claim 20 depends from claim 15, and as a dependent claim therefrom, claim 20 is allowable for at least the reasons claim 15 is allowable. Applicants further submit that claim 20 is also allowable in light of the presence of novel and non-obvious elements contained in claim 20 that are not otherwise present in claim 15.

Dependent Claim 21

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia: “...The circuit of Claim 20, wherein the logic gate is an AND gate,” (Claim 21).

Applicants submit that because claim 21 depends from claim 20, and as a dependent claim therefrom, claim 21 is allowable for at least the reasons claim 20 is allowable. Applicants further submit that claim 21 is also allowable in light of the presence of novel and non-obvious elements contained in claim 21 that are not otherwise present in claim 20.

Dependent Claim 22

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia: "The circuit of Claim 14, wherein the region bits define the top edge, bottom edge, right edge and left edge of a current tile being rendered," (Claim 22). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 22 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of the use of tiles. As such, Applicants submit that the claimed subject matter of claim 22 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination

In addition, Applicants submit that because claim 22 depends from claim 14, and as a dependent claim therefrom, claim 22 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 22 is also allowable in light of the presence of novel and non-obvious elements contained in claim 22 that are not otherwise present in claim 14.

Dependent Claim 24

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia:

“The circuit of Claim 17, wherein the intercept calculation circuit clamps the x-coordinate and y-coordinate of the initial rasterization starting point to the boundary intercept points,”

(Claim 24). Applicants direct the Examiner’s attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 24 is allowable as written. In further support of Applicants’ position, and directing the Examiner’s attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 24 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

Further, Applicants submit that because claim 24 depends from claim 17, and as a dependent claim therefrom, claim 24 is allowable for at least the reasons claim 17 is allowable. Applicants further submit that claim 24 is also allowable in light of the presence of novel and non-obvious elements contained in claim 24 that are not otherwise present in claim 17.

Dependent Claim 25

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicant’s claimed subject matter including, inter alia:

“The circuit of Claim 14, further including an orientation circuit, coupled to the region calculation circuit, operative to generate an orientation bit representing an orientation of a line connecting the sorted first and second vertices with respect to a line connecting the sorted first and third vertices,”

(Claim 25). Applicants direct the Examiner’s attention to the arguments set forth above regarding claims 1 and claim 2 and submit that for the same, and/or similar reasons, that claim 25 is allowable as written. In further support of Applicants’ position, and directing the Examiner’s attention to the claim 1 arguments directed to the lack of any disclosure, teaching or

suggesting, by any combination of the cited references, generating an orientation bit representing the sorting of vertex data for use with tiles and an orientation of a line connecting the sorted first and second vertices. As such, Applicants submit that the claimed subject matter of claim 25 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

Applicants submit that because claim 25 depends from claim 14, and as a dependent claim therefrom, claim 25 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 25 is also allowable in light of the presence of novel and non-obvious elements contained in claim 25 that are not otherwise present in claim 14.

Dependent Claim 26

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia "...The circuit of Claim 14, further including a comparator circuit operative to determine the relative positioning between the vertices of the primitive and the current tile being rendered," (Claim 26).

Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 26 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, the use of tiles. As such, Applicants submit that the claimed subject matter of claim 26 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination

Applicants also submit that because claim 26 depends from claim 14, and as a dependent claim therefrom, claim 26 is allowable for at least the reasons claim 14 is allowable. Applicants

further submit that claim 26 is also allowable in light of the presence of novel and non-obvious elements contained in claim 26 that are not otherwise present in claim 14.

Independent Claim 27

Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 27 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of (1) the sorting of vertex data for use with tiles, (2) use of tiles, (3) use of region bits, and (4) generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 27 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

Independent Claim 28

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia:

“A method, comprising: receiving a pixel tile containing vertex position data for a plurality of primitives; sorting the primitives in axis-dependent order, determining whether the sorted primitives are positioned within a current tile to be transmitted to a rasterizer, determining an initial rasterization point within the sorted primitive,”

(Claim 28). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 28 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, generating an orientation bit representing the sorting of

vertex data for use with tiles, use of tiles, and generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 28 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

Dependent Claims 29-34

First, Applicants acknowledge the Examiner's statement that Narayanaswami et al. fails to teach that the sorting step comprises arranging the position data in descending/ascending y or x-coordinate order.

Applicants submit that at least because claims 29-34 each depend, directly or indirectly, from claim 28, and as a dependent claim therefrom, claims 29-34 are allowable for at least the reasons claim 28 is allowable. Applicants further submit that claims 29-34 are also allowable in light of the presence of novel and non-obvious elements contained in claims 29-34 that are not otherwise present in claim 28.

Dependent Claims 35-40

Applicants submit that the clip code technique used in Narayanaswami et al. discards an object only when all of the out bits for all of the vertices associated therewith are tested, i.e., the "OR" or "AND" operations discussed therein. (col. 1, ln. 57 – col. 2, ln. 23). Therefore, because Narayanaswami et al. requires the comparison of data associated with each vertex, Narayanaswami et al. cannot, and does not, disclose, teach or suggest Applicants' claimed subject matter including "discarding the primitive when *the* x-coordinate position is greater than *the* largest corresponding coordinate position of the current tile," (claim 35), "discarding the primitive when *the* x-coordinate position is less than *the* smallest corresponding coordinate position of the current tile," (claim 36), "discarding the primitive when *the* y-coordinate position is greater than *the* largest corresponding coordinate position of the current tile," (claim 37), and

“discarding the primitive when *the* y-coordinate position is less than *the* smallest corresponding coordinate position of the current tile,” (claim 38). In contrast with that disclosed, taught or suggested by Narayanaswami et al., either when considered alone or when considered in combination with Lentz et al, and Sfarti., Applicants’ novel sorting approach, along with its other novel operational techniques, allows for the discarding of an entire primitive based on a comparison between one x-coordinate position of the primitive with one coordinate position of the current tile.

To the extent that the Office Action made official notice that the clipping process including a comparison between the coordinate values of the primitive with the coordinate values of a current tile is well known in the art, Applicants respectfully request that the Examiner provide a reference as a representative example.


Therefore, since none of the cited references teach or suggest discarding the primitive when the x-coordinate position is greater than the largest corresponding coordinate position of the current tile, discarding the primitive when the x-coordinate position is less than the smallest corresponding coordinate position of the current tile, discarding the primitive when the y-coordinate position is greater than the largest corresponding coordinate position of the current tile, or discarding the primitive when the y-coordinate position is less than the smallest corresponding coordinate position of the current tile, the combination of any of the cited references cannot produce the Applicants’ invention as claimed.

Applicants also submit that because claims 35-40 depend from claim 28, and as dependent claims therefrom, claims 35-40 is allowable for at least the reasons claim 28 is allowable. Applicants further submit that claims 35-40 are also allowable in light of the presence of novel and non-obvious elements contained in claims 35-40 that are not otherwise present in claim 28.

CONCLUSION

For the foregoing reasons, withdrawal of the rejections and allowance of the claims is respectfully requested. If there are any questions or comments regarding this response, the Examiner is encouraged to contact the undersigned at 312-609-7500.

Respectfully submitted,

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